

**WHAT IS CLAIMED IS::**

1. A lithographic apparatus, comprising:
  - a radiation system configured to provide a beam of radiation;
  - a support structure configured to support a patterning device is, said patterning configured to impart a pattern to said beam of radiation;
  - a substrate holder configured to hold a substrate;
  - a projection system that projects said patterned beam onto a target portion of said substrate; and
  - an actuator configured to position at least one part within said radiation system, said support structure, said substrate holder, or said projection system, said actuator comprising a coil arrangement that includes a plurality of coils separated from each other by one or more separation layers of high thermal conductivity material arranged to be in substantial thermal contact with at least one cooling element.
2. A lithographic apparatus according to Claim 1, wherein said separation layers are parallel to the plane of said coil arrangement and wherein said cooling element is located radially outward from said coil arrangement.
3. A lithographic apparatus according to Claim 1, wherein said separation layers are perpendicular to the plane of said coil arrangement and wherein said cooling element is located axially above and/or axially below said coil arrangement.
4. A lithographic apparatus according to Claim 1, wherein said separation layers comprise first layers that are parallel to the plane of said coil arrangement and second layers that are perpendicular to the plane of said coil arrangement and wherein said cooling element comprises first elements located radially outward from said coil arrangement and second elements located axially above or below said coil arrangement.

5. A lithographic apparatus according to Claim 1, wherein at least one of said cooling element and separation layers are formed of steel.

6. A lithographic apparatus according to Claim 1, wherein at least one of said cooling element and said separation layers are formed of ceramic.

7. A lithographic apparatus according to Claim 1, wherein said cooling element is a plate containing cooling channels such that a coolant fluid can be circulated through said cooling channels.

8. A lithographic apparatus according to claim 7, wherein said cooling channels have a substantially circular or a substantially rectangular cross-section.

9. A lithographic apparatus according to Claim 1, wherein said separation layers contain cooling channels such that a coolant fluid can be circulated through said cooling channels.

10. A device manufacturing method comprising:  
providing a substrate held by a substrate holder;  
providing a beam of radiation using an illumination system;  
imparting a desired pattern onto said beam of radiation by a patterning device supported by a support structure;

projecting said patterned beam of radiation onto a target portion of said substrate via a projection system; and

positioning at least one part within said radiation system, said support structure, said substrate holder, or said projection system by an actuator, said actuator comprising a coil arrangement that includes a plurality of coils separated from each other by one or more separation layers of high thermal conductivity material arranged to be in substantial thermal contact with at least one cooling element.

11. A lithographic actuating mechanism, comprising:  
a magnet assembly;  
at least one cooling element; and  
a coil arrangement including a plurality of coils separated from each other by one or more separation layers of high thermal conductivity material arranged to be in substantial thermal contact with said at least one cooling element.
12. A lithographic actuating mechanism according to Claim 11, wherein said separation layers are parallel to the plane of said coil arrangement and wherein said cooling element is located radially outward from said coil arrangement.
13. A lithographic actuating mechanism according to Claim 11, wherein said separation layers are perpendicular to the plane of said coil arrangement and wherein said cooling element is located axially above and/or axially below said coil arrangement.
14. A lithographic actuating mechanism according to Claim 11, wherein said separation layers comprise first layers that are parallel to the plane of said coil arrangement and second layers that are perpendicular to the plane of said coil arrangement and wherein said cooling element comprises first elements located radially outward from said coil arrangement and second elements located axially above or below said coil arrangement.
15. A lithographic actuating mechanism according to Claim 11, wherein at least one of said cooling element and separation layers are formed of steel.
16. A lithographic actuating mechanism according to Claim 11, wherein at least one of said cooling element and said separation layers are formed of ceramic.
17. A lithographic actuating mechanism according to Claim 11, wherein said cooling element is a plate containing cooling channels such that a coolant fluid can be circulated through said cooling channels.

18. A lithographic actuating mechanism according to Claim 17, wherein said cooling channels have a substantially circular or a substantially rectangular cross-section.

19. A lithographic actuating mechanism according to Claim 11, wherein said separation layers contain cooling channels such that a coolant fluid can be circulated through said cooling channels.